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EXAMINER	
BHATTACHARYA, SAM	
ART UNIT	**PAPER NUMBER**
2687	

DATE MAILED: 01/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/813,420	ALLOTT ET AL.	
	Examiner	Art Unit	
	Sam Bhattacharya	2687	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 August 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 2-4 are rejected under 35 U.S.C. 102(e) as being anticipated by Luz et al. (U.S. Patent 6,321,073).

As to claim 2, Figures 1 and 2 in Luz show a radio receiver (100) (see Col. 2, lines 40-67), comprising:

an amplifier (104a, 104b, 104c) configured to receive and amplify an intermediate frequency modulated signal having in-phase and quadrature phase DC components;

an analog-to-digital converter (110) configured to receive the amplified intermediate frequency modulated signal and convert it to a digital signal;

a demodulator (202) operable to demodulate the digital signal; and

DC offset calibration means (202) coupled to the demodulator operable to provide in-phase and quadrature phase DC offset correction signals to compensate for the in-phase and quadrature phase DC components at the input of the amplifier ("the feedforward DC offset compensation circuit 202 generates an in-phase digital error signal 360a (see FIG. 3A) and a quadrature phase DC error signal 360b to remove DC offsets introduced by the ADC or other sources. These signals are combined and subtracted from the signal" (Col. 3, lines 10-14)).

The Luz reference further comprises delay measurement means coupled to the demodulator operable to determine a delay vector characterizing the in-phase and quadrature phase DC components (see Col. 4, lines 20-38).

As to claim 3, the Luz reference discloses the radio receiver of claim 2, wherein the delay vector is used by the DC offset calibration means to provide a digital representation of the in-phase and quadrature phase DC offset correction signals ("Each of these results is truncated into a 20-bit results in truncators 358a and 358b. The result is a DC offset error 360a for the in-phase signal and a DC offset error 360b for the quadrature phase signal" (Col. 4, lines 35-38). See also Col. 4, lines 20-35).

As to claim 4, the Luz reference (Figure 3b) discloses the radio receiver of claim 3, further comprising: a first digital-to-analog converter (386) configured to receive a in-phase component of the digital representation of the in phase DC offset correction signal for mixing with an in-phase signal and an intermediate frequency carrier signal; a second digital-to-analog converter (388) configured to receive a quadrature phase component of the digital representation of the quadrature phase DC offset correction signal for mixing with a quadrature signal and the intermediate frequency carrier signal ("the gain control 384 is input to digital analog converters 386 and 388 simultaneously so that gain control is applied to all gain stages at the same time" (Col. 5, lines 1-3)); and

a summer operable to subtract the mixed quadrature phase signal and quadrature phase DC offset correction signal component from the mixed-in phase signal and in-phase DC offset correction signal to provide a DC compensated intermediate frequency modulated signal at the input of the low noise amplifier ("these DC offset errors 360a and 360b are combined in an error

combiner 362 and a net offset error 364 is subtracted in substractor 332 with the signal 330 to obtain a DC compensated input signal 366" (Col. 4, lines 38-41)).

3. Claim 9 is rejected under 35 U.S.C. 102(e) as being anticipated by Zarubinsky et al. (U.S. Patent Application Publication 2002/0114413 A1).

As to claim 9, the Zarubinsky reference discloses a method of setting signal levels of in-phase and quadrature phase components of a radio receiver between a minimum threshold voltage and a maximum threshold voltage, the method comprising the steps of: (a) setting the gain of an automatic gain control to a gain value at which the signal levels of the in phase and quadrature phase components are less than or equal to the maximum threshold voltage; (b) comparing the signal levels of the in-phase and quadrature phase components to a predetermined minimum threshold value; (c) increasing the gain of the automatic gain control stage by a predetermined amount; and (d) repeating steps (b) and (c) until the signal levels of the in-phase and quadrature phase components are greater than or equal to the predetermined minimum threshold value (see page 2, col. 1, paragraphs [0028], [0030], [0031]; and page 5, col. 2, paragraphs [0089] to [0092]).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,321,073 to Luz et al. in view of Galal et al. (U.S. Patent 6,161,004).

As to claim 5, the Luz reference (Figures 1 and 2) discloses a radio receiver (100) (see Col. 2, lines 40-67), comprising:

an automatic gain control stage (104a, 104b, 104n) coupled to the summer and operable to amplify the integrated signal;

an analog-to-digital converter (110) operable to convert the amplified integrated signal to a digital signal;

a demodulator (202) operable to demodulate the digital signal; and

delay measurement means (202) for determining a delay vector from inputs of the low pass filters to an output of the demodulator (see Col. 4, lines 20-38).

However, it does not disclose a receiving stage configured to receive a radio signal; a first mixer stage operable to downconvert the radio frequency signal to a first intermediate frequency in-phase signal and a first intermediate quadrature phase signal; first and second low pass filters configured to receive and low pass filter the first intermediate frequency in-phase and quadrature phase signals; a second mixer stage operable to upconvert the filtered first intermediate frequency in-phase and quadrature phase signals and provide a second intermediate frequency in-phase signal and a second intermediate frequency quadrature phase signal; and a summer operable to subtract the second intermediate frequency quadrature phase signal from the second intermediate frequency in-phase signal to provide an integrated signal;

The Galal reference teaches a receiving stage configured to receive a radio signal; a first mixer stage operable to downconvert the radio frequency signal to a first intermediate frequency

in-phase signal and a first intermediate quadrature phase signal; first and second low pass filters configured to receive and low pass filter the first intermediate frequency in-phase and quadrature phase signals; a second mixer stage operable to upconvert the filtered first intermediate frequency in-phase and quadrature phase signals and provide a second intermediate frequency in-phase signal and a second intermediate frequency quadrature phase signal; and a summer operable to subtract the second intermediate frequency quadrature phase signal from the second intermediate frequency in-phase signal to provide an integrated signal (see Figure 18 and Col. 10, line 8 to Col. 11, line 56).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Luz to comprise a receiving stage configured to receive a radio signal; a first mixer stage operable to downconvert the radio frequency signal to a first intermediate frequency in-phase signal and a first intermediate quadrature phase signal; first and second low pass filters configured to receive and low pass filter the first intermediate frequency in-phase and quadrature phase signals; a second mixer stage operable to upconvert the filtered first intermediate frequency in-phase and quadrature phase signals and provide a second intermediate frequency in-phase signal and a second intermediate frequency quadrature phase signal; and a summer operable to subtract the second intermediate frequency quadrature phase signal from the second intermediate frequency in-phase signal to provide an integrated signal, as taught by Galal, in order to implement a dual path mixing network to provide for balanced gain and group delay distortion among the upper and lower paths of the mixing network.

As to claim 6, Luz-Galal discloses the radio receiver of claim 5. The Luz reference further teaches: a DC offset calibrator coupled to the delay measurement means (see Col. 4, lines

20-38); an in-phase digital-to-analog converter coupled between the DC offset calibrator and the second mixer stage; and a quadrature phase digital-to-analog converter coupled between the DC offset calibrator and the second mixer stage, wherein the in-phase digital-to-analog converter is operable to provide an in-phase DC offset compensation signal for the automatic gain control stage and the quadrature phase digital-to-analog converter is operable to provide a quadrature phase DC offset compensation signal for the automatic gain control stage ("the gain control 384 is input to digital analog converters 386 and 388 simultaneously so that gain control is applied to all gain stages at the same time" (Col. 5, lines 1-3). See also Col. 4, lines 38-67).

6. Claims 7, 8, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication 2002/0114413 A1 to Zarubinsky et al. in view of Galal et al. (U.S. Patent 6,161,004).

As to claim 7, the Zarubinsky reference discloses a method of determining a signal delay between inputs of first and second low pass filters and an output of the receiver's demodulator, the method comprising the steps of: applying a first known voltage to an input of an in phase mixer of the second mixer stage; applying a second known voltage to an input of a quadrature phase mixer of the second mixer stage; setting the gain of an automatic gain control stage, coupled to the second mixer stage, to a full gain; measuring first in-phase and first quadrature phase components at the output of the demodulator; decreasing the gain of the automatic gain control stage by a predetermined amount if the value of each first component is greater than a predetermined maximum threshold value; storing the first in-phase and quadrature phase components if the value of each component is less than the predetermined maximum threshold value; applying the negative of the first known voltage to the input of the in-phase mixer;

applying the value of the second known voltage to the input of the quadrature phase mixer; measuring second in-phase and second quadrature phase components at the output of the demodulator; decreasing the gain of the automatic gain control stage by a predetermined amount if the value of each second component is greater than the predetermined maximum threshold value; storing the second in-phase and quadrature phase components if the value of each second component is less than the predetermined maximum threshold value; and using the first and second quadrature phase components to compute the signal delay (see page 3, col. 1, paragraphs [0044] to page 5, col. 1, paragraph [0082] and Figures 5-8).

However, the Zarubinsky reference does not expressly disclose a dual mixer stage radio receiver. The Galal reference teaches a dual mixer stage radio receiver (Figure 18 and Col. 10, line 8 to Col. 11, line 56).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Zarubinsky for a dual mixer stage radio receiver, as taught by Galal, in order to implement a dual path mixing network to provide for balanced gain and group delay distortion among the upper and lower paths of the mixing network.

As to claim 8, the Zarubinsky reference discloses a method of compensating for DC offset voltages present at an input of a low noise amplifier, the method comprising the steps of:

determining a signal delay between an output of a second mixer stage of the dual mixer stage radio receiver, said signal delay characterizing in phase and quadrature phase components of the DC offset voltage present at the input of the low noise amplifier ("delay stage 207 forwards signal X'_D with a delay of N time slots T. The symbol Z_{-N} is an operator of a Z-

transformation. Persons of skill in the art can implement delay stage 207 with out the need of detailed explanation herein, for example, by a shift register. The delay of stage 207 conveniently corresponds to the intrinsic input-to-output delay introduced in in-phase channel 291 (e.g., by DAC 293, LPF 295. This is convenient. As explained in connection with FIG. 3, the "input related" signal X_D is combined with the delayed "output related" X_A (page 5, col. 1, paragraph [0077]));

using the determined signal delay to separate and define digital representations of the in-phase DC offset voltage component and the quadrature phase DC offset voltage component ("FIG. 9 illustrates a simplified block diagram of offset compensation control loop 401" (page 5, col. 2, paragraph [0094], lines 1-2). "Integrator 441 obtains an estimation of the magnitude and feeds back a compensation offset signal OCOMP (P,P) to either one of the inputs of corresponding digital comparator 221. In the example of FIG. 9, this implemented by subtracting OCOMP (P,P) form ID(P) by subtractor 411. Delay stage 431 delays by the delay time introduced by channel 292" (page 5, col. 2, paragraph [0095]));

making the digital representation of each of the in-phase and quadrature phase components more positive or more negative if it is more negative or more positive than a predetermined minimum threshold or maximum threshold; and performing the above sequence of steps a predetermined number of times to reduce the DC offset voltage at the input of the low noise amplifier (see page 6, col. 1, paragraphs [0097] and [0098]).

However, the Zarubinsky reference does not expressly disclose a dual mixer stage radio receiver. The Galal reference teaches a dual mixer stage radio receiver (Figure 18 and Col. 10, line 8 to Col. 11, line 56).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Zarubinsky for a dual mixer stage radio receiver, as taught by Galal, in order to implement a dual path mixing network to provide for balanced gain and group delay distortion among the upper and lower paths of the mixing network.

As to claim 10, the Zarubinsky reference discloses a method of compensating for DC offset voltages at inputs of in-phase and quadrature phase low pass filters, said method comprising the steps of:

determining a signal delay vector between the inputs of the low pass filters, said signal delay vector characterizing in-phase and quadrature phase components of DC offset voltages at the inputs of the low pass filters ("delay stage 207 forwards signal X'_D with a delay of N time slots T. The symbol Z_{-N} is an operator of a Z-transformation. Persons of skill in the art can implement delay stage 207 with out the need of detailed explanation herein, for example, by a shift register. The delay of stage 207 conveniently corresponds to the intrinsic input-to-output delay introduced in in-phase channel 291 (e.g., by DAC 293, LPF 295. This is convenient. As explained in connection with FIG. 3, the "input related" signal X_D is combined with the delayed "output related" X_A (page 5, col. 1, paragraph [0077]));

using the signal delay vector to separate and define in-phase and quadrature phase multiplication factors associated with the in-phase and quadrature phase DC offsets ("FIG. 9 illustrates a simplified block diagram of offset compensation control loop 401" (page 5, col. 2, paragraph [0094], lines 1-2). "Integrator 441 obtains an estimation of the magnitude and feeds back a compensation offset signal OCOMP (P,P) to either one of the inputs of corresponding

digital comparator 221. In the example of FIG. 9, this implemented by subtracting OCOMP (P,P) form ID(P) by subtractor 411. Delay stage 431 delays by the delay time introduced by channel 292" (page 5, col. 2, paragraph [0095]));

incrementally adjusting the signal level of the in-phase component to a more positive or more negative value if the in-phase multiplication factor has a negative or positive value, respectively; and incrementally adjusting the signal value of the quadrature phase component to a more positive or more negative value if the quadrature phase multiplication factor has a negative or positive value, respectively (see page 6, col. 1, paragraphs [0097] and [0098]).

However, the Zarubinsky reference does not expressly disclose a dual mixer stage radio receiver. The Galal reference teaches a dual mixer stage radio receiver (Figure 18 and Col. 10, line 8 to Col. 11, line 56).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Zarubinsky for a dual mixer stage radio receiver, as taught by Galal, in order to implement a dual path mixing network to provide for balanced gain and group delay distortion among the upper and lower paths of the mixing network.

Response to Arguments

1. Applicant's arguments filed 8/26/04 have been fully considered but they are not persuasive.

Applicant argues that Luz does not teach a delay measurement means coupled to the demodulator operable to determine a delay vector characterizing in-phase and quadrature phase

DC components, or a delay vector from inputs of the low pass filters to an output of the demodulator. Examiner respectfully disagrees. The DC offset compensation circuits 334 and 336 are for the in-phase and quadrature paths, respectively. Each of them determines a delay vector, corresponding to the DC offset compensation in these paths. This results in in-phase and quadrature DC offset errors 360a and 360b. Note that the claims do not recite a delay vector angle that can be used to separate in-phase and quadrature offset components, which allow their cancellation. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Moreover, Examiner relies on the Galal reference, rather than Luz, for a teaching of low pass filters associated with an output of a demodulator.

Applicant argues that the cited references do not teach using first and second quadrature phase components to compute the signal delay, or at an output of the second mixer stage. Examiner respectfully disagrees. Delay stages 234 and 244 in Zarubinsky, for example, clearly teach using first and second quadrature phase components to compute the signal delay. Even though the delay stages are provided to synchronize signals, this does not distinguish the claims of the present invention from Zarubinsky. Delay stages 207 and 208 are also shown at outputs of second mixer stages.

Applicant argues that Zarubinsky does not teach setting the gain to a value at which levels of the in-phase and quadrature components are less than or equal to a maximum threshold voltage. Examiner respectfully disagrees. Zarubinsky teaches matching the gains of the I and Q paths, and in doing so the gains are set to a maximum threshold voltage.

Conclusion

2. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sam Bhattacharya whose telephone number is (703) 605-1171. The examiner can normally be reached on weekdays 8:30 a.m. to 6:00 p.m., first Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lester G. Kincaid can be reached on (703) 305-3016. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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